The Structure of Economic Segmentation: A Dual Economy Approach[1]

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We note the need for a measure of economic segmentation based on current empirical data for a range of theoretically relevant indicators. Drawing on a dual economy interpretation of the relationship between economic organization and labor market structure, we identify a set of empirical indicators which relate to the degree of oligopoly versus competition in industrial settings. We use factor analysis to test the dual economists' expectation of a common dimension underlying indicators of economic concentration and scale and the characteristics of product and labor markets. After confirming this expectation, we use factor scores to define an index of segmentation for industrial categories. Finally, we demonstrate the application of dichotomous and continuous segmentation measures to the analysis of a simple earnings determination model.

In the past decade there has been a resurgence of interest in the economic structure of industrial capitalism (Galbraith 1967; Baran and Sweezy 1966; Shepherd 1979). One expression of this interest in the economic organization of industry is the literature on the dual economy (Averitt 1968; Bluestone, Murphy, and Stevenson 1973; Gordon 1972; Edwards 1975). This interest in economic structure has received added research impetus from a recent trend of reaction against individualistic research traditions in social stratification (Bibb and Form 1977; Beck, Horan, and Tolbert 1978; Horan 1978).

Although dual economy theory traces its intellectual origins to a diverse set of theoretical and empirical works, in recent years it has achieved a growing coherence as a view of the industrial structure of modern capitalism. In the present paper, we attempt to contribute to that coherence by examining the measurement of a key theoretical concept, the concept of "economic segmentation." We argue that despite the diversity in the original literature from which dual economy theory derives, there is sufficient consensus on empirical indicators to provide a basis for empirical specification of the economic sectors proposed in that literature.

The basic theme which characterizes the dual economy approach—the importance of differences in economic organization for social structure and individual behavior—is one of long-standing interest in the social sciences. J. H. Boeke (1953), an early proponent of the importance of sectoral differences for colonial economic development, proposed a model of economic dualism which contrasted the Western industrial and the traditional agricultural sectors. Similarly, J. S. Furnivall's (1944, 1948) characterization of social and economic segmentation in the Far Eastern colonies as a "plural society" has inspired considerable interest among anthropologists interested in the British West Indies (see, e.g., Smith 1965; Rubin 1960). The effect of this anthropological tradition has been to deemphasize the importance of economic pluralism relative to cultural pluralism. In contrast, use of the concept of dual economy in the economic development literature has tended to emphasize the existence of sectors defined in terms of the social and economic organization of production.[2] Such an emphasis seems quite compatible with the approach to the dual economy employed here.

A more proximate origin for what is now referred to as dual economy theory is a set of studies of local urban labor markets conducted during the late 1960s (see, e.g., Baron and Hymer 1968; Wachtel 1970; Vietorisz and Harrison 1970; Harrison 1972). Among the common themes noted by Gordon (1972) in his review of this literature are the relative separation of two historically defined labor markets (sectors) which he designates as "primary" and "secondary." The organization of work in the secondary sector is characterized by low-skill jobs and employment instability, whereas the organization of work in the primary sector provides job ladders, on-the-job training, and a differentiated wage structure.

The literature on economic segmentation exhibits substantial intellectual diversity. One important source of such diversity is the conceptualization of economic segmentation. Researchers in the dual labor market literature tend to focus on such characteristics as wages, working conditions, chances for advancement, and employment stability as delimiters of sectoral distinctions. In contrast, researchers in the dual economy literature tend to focus on industrial structure and the economic organization of production as the basis for sectoral distinctions.

At one level these differences may be treated as differences in emphasis. Dual labor market writers tend to stress the description of segmentation in labor markets, with relatively little concern for the origins of such segmentation. Dual economy writers acknowledge the existence of segmentation in labor markets, but treat it as the consequence of more funda-

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[2] For an overview of the role of economic dualism in development literature, see Meier (1964), esp. chap. 2.

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mental processes of segmentation in the economic order. "The central theoretical assertion . . . is that behavior observed in the labor market . . . reflects more fundamental processes in production itself. . . . To understand the labor market processes which 'produce' group differences in incomes, unemployment, and mobility, then, we must investigate the institutional arrangements governing production" (Edwards et al. 1975, p. 4).

The present effort to construct an empirical measure of economic segmentation employs indicators of labor market characteristics as well as indicators relating to the economic organization of production. While our analysis does not assume the primacy of one set of indicators over another, it provides a basis for evaluating the dual economists' suggestion that economic organization and labor market characteristics are interrelated.

OLIGOPOLY, COMPETITION, AND THE DUAL ECONOMY

Concern with the economic structure of contemporary industrial societies has come to focus increasingly on the distinction between competitive and monopoly capitalism. While neoclassical economists and sociologists have been content to base their theories and analyses on the assumption of a pure competitive market system, their counterparts in the dual economy tradition have questioned the applicability of a competitive model to those portions of the economy characterized by monopolistic or oligopolistic forms of organization.[3] Baran and Sweezy (1966, p. 6) provide a clear statement of this position: "Today the typical economic unit in the capitalist world is not the small firm producing a negligible fraction of a homogeneous output for an anonymous market, but a large-scale enterprise producing a significant share of the output of an industry, or even several industries, and able to control its prices, the volume of its production, and the types and amounts of its investments. It is therefore impermissible to ignore monopoly in constructing our model of the economy and to go on treating competition as the general case."

Dual economists have attempted to use this distinction between portions of the economy characterized by competitive and oligopolistic organization as a basis for defining distinct economic sectors. Averitt (1968, p. 1) defines the dual economy in terms of "two disparate types of business organization" which he refers to as "center firms" and "periphery firms": "Center firms differ from periphery firms in terms of economic size, organizational structure, industrial location, factor endowment, time perspective and market concentration." Although Averitt identifies his

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[3] In what follows we use the term "oligopoly" to refer to all situations in which some subset of firms in an industry possesses market power. Oligopoly thus subsumes situations of pure monopoly, tight oligopoly, and loose oligopoly (Shepherd 1979, p. 62).

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center and periphery economic sectors as consisting of "firms," he attaches a very different meaning to this term from that which might be suggested by a casual reading. Specifically, "[t]he word 'firm' refers to the business organization of industry" (Averitt 1968, p. 3). Later writers refer to differences between industries in the organization of production as "industrial" differences, a trend which we shall continue in the present paper.

For these writers the distinction between oligopolistic and competitive capitalism constitutes a major dimension in the industrial organization of production. Bluestone et al. (1973, pp. 28–29) describe a two-sector model of industrial segmentation as follows:

> The core economy includes those industries that comprise the muscle of American economic and political power. . . . [t]he firms in the core economy are noted for high productivity, high profits, intensive utilization of capital, high incidence of monopoly elements, and a high degree of unionization. Workers who are able to secure employment in these industries are, in most cases, assured of relatively high wages and better than average working conditions and fringe benefits. . . .
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> Beyond the fringes of the core economy lies a set of industries that lack almost all of the advantages normally found in center firms. . . . The periphery industries are noted for their small firm size, labor intensity, low profit, low productivity, intensive product market competition, lack of unionization, and low wages. Unlike core sector industries, the periphery lacks the assets, size and political power to take advantage of economies of scale or to spend large sums on research and development.

Traditionally economists have sought to measure industrial oligopoly in terms of the market power concentration within an industry. Concentration refers to the portion of the business activity (market shares) within an industry which is controlled by a small number of firms. This is conventionally measured as the proportion of activity under the control of the four largest firms in an industry. In the past decade there has been a reaction against this overly simplistic, single-factor model of market power. Shepherd (1970, p. 47) presents the multifactor approach to monopoly as follows: "In summary, structural monopoly has a number of elements formal and informal, internal and external. They probably include (1) market shares and asymmetry . . . (2) barriers to entry and the whole range of cooperative arrangements which reflect informal or 'soft' structure . . . and (3) primarily relative size, diversification and vertical patterns among external elements." Shepherd argues that while no single element constitutes a satisfactory measure for the degree of market power present in an industry, "a combination of several elements may indicate a high degree of probability that market power is present" (1970, p. 47).

We follow Shepherd (1970, 1979) in seeking to base our designation of competitive and oligopolistic economic sectors on a set of multiple in-

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dicators. For present purposes we can group the indicators of industrial oligopoly which are listed in table 1 into three general categories: (1) measures of the capacity for oligopoly in an industry, (2) measures of oligopolistic behavior in the industrial product market, and (3) measures of oligopolistic behavior in the industrial labor market.

The first group of variables includes factors that reflect the potential for exercising oligopolistic market power. Most central to this capacity for oligopoly is market concentration. Other related factors are indicators of economic scale, which may be viewed as concomitants of vertical integration and barriers to entry (both of which are elements of the potential for industrial oligopoly). As Shepherd (1979, p. 180) notes, the capacity for oligopoly does not necessarily lead to oligopolistic market behavior within individual industries. The "core" sector described by dual economy theorists is one in which industries act upon their capacity through oligopolistic behavior in industrial product and labor markets. In the product market we use profit levels and industry levels of political contributions and advertising expenditures as indicators of oligopolistic behavior. Edwards (1975) has argued that oligopoly has important implications for labor markets as well as for product markets. Our indicators of oligopolistic behavior in labor markets include measures of bureaucratic organization, wages, and work stability at the industry level.

In the analysis below, we bring together these multiple indicators of economic oligopoly in an attempt to construct a measure of economic segmentation. Heretofore, researchers interested in employing the dual economy distinction between core and periphery economic sectors have rather arbitrarily grouped industries according to narrative descriptions found in the literature. Bibb and Form (1977) follow Averitt's (1968) criteria and assign major industry divisions to core and periphery sectors. Beck et al. (1978) use the discussion of economic sectors in Bluestone et al. (1973) to classify industries in a similar two-sector scheme.

Although these operationalizations of the core/periphery concept have produced interesting results, neither is entirely satisfactory. First, the seminal treatments of dual economy theory by Averitt (1968) and Bluestone et al. (1973) do not always correspond on the allocation of industries to core and periphery sectors. Consequently, a comparison of the sector variables employed by Bibb and Form (1977) and by Beck et al. (1978) reveals some important discrepancies in the placement of specific industries. For example, the latter place wholesale trade, finance, and professional industries in the core, while the former place all of these in the periphery.

A second unsatisfactory characteristic of these operationalizations is that neither reflects a set of consistent empirical criteria applied to a

TABLE 1

VARIABLES, EXPLANATIONS, AND DATA SOURCES

Variable	Explanation	Source
X_1 Adv...............	Mean expenditure on advertising by corporations (1972)	IRS (1972a), tables 4.1 and 5.1
X_2 Assets...............	Mean assets of corporations (1972)	IRS (1972b), table 1
X_3 Concen...............	Four-firm adjusted concentration ratio (1966)	Shepherd (1969), table A
X_4 Fringe...............	Mean fringe benefit expenditure per worker (1972)	IRS (1972a), tables 2.2, 3.2, 4.1, 5.1
X_5 Hrlywage...............	Mean hourly wage of production and nonsupervisory workers (1976; adjusted to 1972 dollars)	BLS (1977b), table C-2
X_6 Mincome...............	Median annual income of workers (1969; adjusted to 1972 dollars)	U.S. Bureau of the Census (1973), table 1
X_7 Polcont...............	Mean political contributions (1972)	Common Cause (1972), vols. 1 and 2
X_8 Profit...............	Mean profit (or net income) of business units (1972)	IRS (1972a), tables 2.1, 3.1, 4.1, 5.1
X_9 Psuper...............	Proportion supervisory or nonproduction personnel (1976)	BLS (1977a), tables B5 and B6
X_{10} Punion...............	Proportion of unionized workers (1970)	BLS (1976), table 142
X_{11} P5052...............	Proportion of workers working 50–52 weeks per year (1969)	U.S. Bureau of the Census (1973), table 6
X_{12} Quits...............	Mean number of voluntary or involuntary terminations per 100 workers (1976)	BLS (1977b), table D-2
X_{13} Receipts...............	Mean business receipts (1972)	IRS (1972a), tables 2.1, 3.1, 4.1, 5.1
X_{14} Tenure...............	Median years employed with same firm for males (1972)	BLS (1973), table E
X_{15} Wklyhrs...............	Mean hours worked per week by production and nonsupervisory personnel (1976)	BLS (1977b), table C-2
X_{16} Wklywage...............	Mean weekly wage for production and nonsupervisory personnel (1976)	BLS (1977b), table C-2
X_{17} Wnworkrs...............	Mean number of workers per business unit (1970)	U.S. Bureau of the Census (1973), table 1

range of industries.[4] Averitt (1969) presents a variety of descriptive information for a limited set of industries, primarily manufacturing. Bluestone et al. (1973) consider a variety of industries but focus primarily on wage data. There is a clear need for empirical evidence that covers the full range of industries and the full range of measures required by the dual economy concept. A systematic analysis of such data should help to eliminate discrepancies among existing measures of economic sector and thus provide a stronger foundation for further research.

The goal of this analysis is to provide a measure of economic segmentation which is consistent with dual economy theory and based on current empirical information. Dual economists use the concept of economic sector to emphasize the impact of economic organization on socioeconomic processes. However, the use of polar types such as competitive and oligopolistic capitalism does not deny the existence of a gradation in industrial competition ranging from highly competitive at one extreme to highly oligopolistic at the other extreme: "Oligopoly is complex for three main reasons. First, there are infinite gradients in the degree of oligopoly. . . . Second, the degree and effect of the interdependence *need not be strong*. Oligopolists may fight or coordinate, or simply ignore each other and pursue independent policies. . . . Third, the group's internal structure may influence the outcome. A symmetric group (all members equal) may behave differently from an asymmetric group (dominated by one firm). There are infinite varieties of such internal structures, both in theory and in actual markets" (Shepherd 1979, pp. 180–81).

Thus an industry with high market concentration does not necessarily operate in an oligopolistic fashion. This is one reason that the present analysis includes measures of economic scale and oligopolistic behavior in product and labor markets as well as concentration. Further, the "test" of dual economy theory which our analysis provides is not a test of the existence of a bimodal distribution or a "sectoral boundary" on one or more empirical indicators. Instead our analysis constitutes a test for the existence of an underlying dimension which is common to all indicators and which exhibits the patterns of relationships predicted by dual economy theory. The discontinuities suggested by dual economy theory are not discontinuities in the distribution of defining characteristics. Instead, they are discontinuities in the work situations and socioeconomic experiences of individual workers (Beck et al. 1978; Horan, Tolbert, and Beck 1979), a topic to which we shall return later in our analysis.

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[4] Hodson (1977) takes a step in the direction of comprehensiveness by analyzing five characteristics of roughly 200 industries. He presupposes three sectors in the economic structure: monopoly, competition, and state.

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DATA COLLECTION AND ANALYSIS

The accumulation of data to be used in the measurement of economic segmentation was organized according to two principal considerations: (1) industries were to be the basic unit of analysis; (2) current, contemporaneous data were needed for a set of conceptually relevant indicators. Despite some variation in terminology, there is considerable consistency in the dual economy literature regarding the choice of industry as the appropriate unit of analysis. Bluestone et al. (1973) discuss the sectoral distinction in terms of industries, while Averitt (1978) focuses on "firms" which he defines in terms of the "business organization of industries." Shepherd (1970, p. 34) notes that "[m]arket power is held by firms but it is exercised in markets," while Spilerman (1977, p. 579n.) suggests that similarities in technology, organization, and demand make industry the appropriate unit of analysis in the study of internal labor markets.

The important point to keep in mind here is that the oligopoly/competition distinction is definitionally concerned with characteristics of industrial market situations, not with those of individual firms. In the present analysis, data on firms are averaged at the industry level and used, along with other industry characteristics, to provide an economic profile of industry groupings. Thus, industry is treated here as the major locus for variations in competitive structure as indexed by levels of economic concentration and scale, characteristics of product markets, and characteristics of labor markets.

The empirical indicators of oligopolistic/competitive market structure used in this analysis fall into one of the three basic categories introduced above: (1) measures of the capacity for oligopoly in an industry, (2) measures of oligopolistic behavior in the industrial product market, and (3) measures of oligopolistic behavior in the industrial labor market. As measures of the capacity for oligopoly we use the traditional measure of market concentration (X_3) and several measures of economic scale, including assets (X_2), receipts (X_{13}), and number of workers (X_{17}). As measures of oligopolistic behavior in the industrial product market we include levels of advertising expenditures (X_1),[5] political contributions (X_7), and profit (X_8). Edwards (1975, p. 21) argues that internal labor markets are "a direct offspring of the consolidation of monopoly capitalist power and the consequent imposition of bureaucratic control." In addition to a measure of the relative size of the bureaucratic work force (X_9), our analysis employs measures of the extent of internal labor market development in an industry. The latter include unionization (X_{10}), levels of

[5] Ornstein (1977) examines a variety of measures of advertising, particularly ratios of advertising to sales. He discovers little consistency in the findings of the economic research tradition. Thus, the simple mean advertising expenditure is employed here.

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wages (X_5, X_6, X_{16}), fringe benefits (X_4),[6] and job stability in both the short run (X_{12}, X_{15}) and the longer run (X_{11}, X_{14}).

In the initial stages of data collection, the 215 industry categories established by the U.S. Bureau of the Census (1971) were employed. For most of the variables of interest, however, data were not available for such detailed industrial categories. The industry categories employed here are aggregated to a total of 55 to correspond with the archival data sources and allow maximum use of available information.[7] The professional and public administration industries are consistently omitted or underrepresented in the data sources and are deleted from our initial analysis. The problem here is that many of the variables concerning economic scale and oligopolistic behavior in product and labor markets are either not relevant to these industries or not available. (See table 1 for a complete listing of variables and data sources.) Following a discussion of the analysis for the other 55 industries, we shall return to a consideration of the professional and public administrative categories.

We have noted above that dual economy theory suggests empirical regularities in the relationship between industrial capacity for oligopoly (as indexed by economic concentration and scale) and indicators of oligopolistic behavior in product and labor markets. Given this conception of multiple indicators relating to an underlying dimension, the use of factor analytic procedures seems appropriate. Such an analysis will provide tests both on the existence of an underlying dimension and on the conformity of interrelationships among the indicators to theoretical expectations. If both tests are successful, the factor analysis procedure will also provide factor scores which can be used to specify the economic segmentation of industry.

The correlations, means, and standard deviations for the 17 indicators are presented in table 2. All of the variables appear to covary in accordance with theoretical expectations. The only negative relationships involve the "quits" variable, which is as expected. All other variables are positively related with one another. In fact, 18 of the correlations exceed 0.70 and are indicated by asterisks (*) in table 2. The multicollinearity indicated here is not a problem for the factor solution itself, but may raise problems for our computation of factor scores. Harman (1976, p. 369)

[6] These benefits include employer contributions to pension, annuity, retirement, profit sharing, stock bonus, health insurance, and life insurance programs.

[7] In a few instances where discrepancies remained between this industry classification and data sources, variable values were allocated on the basis of existing information. Data that were too detailed were simply summed to represent the aggregate industry category used here. In instances of lack of detail, a weighted disaggregation procedure was employed. Either the number of firms or the number of workers in an industry was used as a weight in an effort to approximate the variable value.

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TABLE 2

CORRELATION COEFFICIENTS, MEANS, AND STANDARD DEVIATIONS OF INDUSTRY VARIABLES

Variable	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}	X_{16}	$\bar{X}$	SD
X_1 Adv																	54,304.74	188,125.34
X_2 Assets	.41																5,763,473.92	14,650,229.59
X_3 Concen	.11	.33															49.89	20.95
X_4 Fringe	.48	.76*	.54														572.53	682.49
X_5 Hrlywage	.49	.18	.63	.47													6.46	1.68
X_6 Mincome	.02	.24	.65	.49	.78*												6,377.32	1,664.50
X_7 Polcont	.38	.80*	.18	.78*	.26	.24											17.13	75.38
X_8 Profit	.72*	.78*	.22	.84*	.25	.22	.89*										247,797.24	827,768.64
X_9 Psuper	.13	.28	.53	.46	.46	.63	.27	.27									.20	.09
X_{10} Punion	.12	.01	.32	.22	.59	.38	.09	.12	.30								.33	.29
X_{11} P5052	.10	.30	.63	.48	.49	.80*	.23	.23	.60	.24							.65	.11
X_{12} Quts	-.23	-.30	-.27	-.42	-.44	-.42	-.30	-.37	-.23	-.04	-.29						1.71	.60
X_{13} Receipts	.54	.82*	.22	.85*	.28	.26	.97*	.97*	.30	.12	.25	-.35					3,801,088.24	12,409,668.26
X_{14} Tenure	.16	.42	.52	.51	.37	.32	.43	.24	.42	.19	.50	-.29	.49				4.74	2.49
X_{15} Wklyhrs	.10	.22	.53	.45	.56	.67	.22	.28	.59	.55	.74*	-.20	.26	.42			37.62	3.89
X_{16} Wklywage	.07	.22	.66	.53	.97*	.83*	.29	.28	.54	.62	.62	-.44	.32	.43	.71*		248.51	78.18
X_{17} Wnworkrs	.57	.50	.36	.74*	.28	.30	.45	.68	.36	.28	.37	-.36	.62	.41	.41	.36	42.58	68.99

* $r > .70$.

presents the widely accepted regression algorithm for the construction of factor scores:

$$\mathbf{B} = \mathbf{S}' \ \mathbf{R}^{-1}, \tag{1}$$

where $\mathbf{B}$ is a matrix of scoring weights, $\mathbf{S}$ is the factor structure matrix, and $\mathbf{R}$ is the correlation matrix. From (1) we see that the correlation matrix must be inverted in order to compute factor scores. In the present case, the determinant of the correlation matrix ($\mathbf{R}$) is 0.12×10^{-11}, which means that $\mathbf{R}$ is ill conditioned.[8]

The redundancies evident among the variables in table 2 can be eliminated by selecting variables which can stand as proxies for clusters of highly intercorrelated variables. As is evident in table 3, profit and median income provide the best proxies for redundant variables. In each instance of substitution, the proxy variables share at least 50% variance with the variables which they represent.

The results of a factor analysis on this reduced set of variables appear in table 4. This solution is unidimensional with all variables loading on the factor at 0.42 or higher.[9] Clearly, the variables covary in a manner consistent with dual economy theory. Industries with large values on the economic concentration and scale variables exhibit characteristics associated with product and labor market powers as well. Factor scores were computed for this solution, and these are listed along with the industry categories in table 5. The highest ranking industries on the factor score are petroleum products and motor vehicles. The two lowest industries are

TABLE 3

DISPOSITION OF REDUNDANT VARIABLES

Redundant Variable	Proxy for Variable
(X_{11})P5052	(X_6)Mincome, (X_{15})Wklyhrs
(X_{16})Wklywage	(X_6)Mincome, (X_{15})Wklyhrs
(X_5)Hrlywage	(X_6)Mincome
(X_4)Fringe	(X_8)Profit, (X_{17})Wnworkrs
(X_1)Adv	(X_8)Profit
(X_7)Polcont	(X_8)Profit
(X_2)Assets	(X_8)Profit
(X_{13})Receipts	(X_8)Profit

[8] A factor analysis on all 17 variables produced an oblique (promax) solution with two factors correlated at .40, accounting for 72.0% of the variance. One factor was dominated by the economic scale and product market variables and the other by the labor market characteristics. Proportion of supervisory personnel, tenure, and concentration were weighted moderately on both factors. Although consistent with expectations derived from dual economy theory, the solution nevertheless produced highly unstable scoring weights and for this reason was not used.

[9] Factors were retained if the eigenvalues were greater than 1.0 following principal axis iteration.

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TABLE 4

RESULTS OF FACTOR ANALYSIS ON NONREDUNDANT VARIABLES

Variable	Factor Pattern	Commu- nality	Scoring Weight
X_3 Concen.............	.721	.521	.180
X_6 Mincome*.........	.767	.588	.133
X_8 Profit†.............	.478	.228	.095
X_9 Psuper.............	.709	.503	.158
X_{10} Punion............	.457	.209	.044
X_{12} Quits..	−.424	.179	−.060
X_{14} Tenure............	.598	.358	.130
X_{15} Wklyhrs‡..........	.770	.593	.246
X_{17} Wnworkrs§........	.598	.358	.156
Eigenvalue............	3.538		

* Serves as proxy for P5052, Wklywage, Hrlywage.
† Serves as proxy for Fringe, Adv, Polcont, Assets, Receipts.
‡ Serves as proxy for P5052 and Wklywage.
§ Serves as proxy for Fringe.

in retail trade: apparel sales and eating and drinking places. The mean of the factor score distribution is zero by construction. The symmetry of the distribution (skewness = 0.17), however, is not a technical artifact but an interesting empirical outcome. It indicates that the variables employed here are effective in differentiating uniformly among a variety of industries.

SPECIFICATION OF ECONOMIC SEGMENTATION

There are two distinct approaches to the use of economic segmentation data in the analysis of social structure and process. The emphasis in the present paper follows Beck et al. (1978) in interpreting economic segmentation as a contextual factor, which operates in such a way as to condition the effects of basic socioeconomic processes on individual workers. Such an interpretation, which we have associated with the dual economy perspective, calls for a categorical distinction between competitive and oligopolistic industries in that basic socioeconomic processes are expected to differ for oligopolistic and competitive environments.

A second approach to the use of economic segmentation data emphasizes the distinction between "structural" variables, such as the economic organization of industry, and "individual" variables, such as education and social background factors (see, e.g., Bibb and Form 1977). So long as the relationship between such structural and individual variables is assumed to be additive, researchers may prefer to avoid any possible loss of information due to categorizing data on industrial differentiation and rely instead on a quantitative measure of the level of competition/oli-

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gopoly in the various industries. In the following, we define two measures of economic segmentation, one appropriate to each of these research strategies, and illustrate the application of these measures to analysis of simple earnings determination models.

Our first task is to use the factor analysis reported above to classify industries into core and periphery sectors. Other things being equal, a conventional point at which to split a symmetric distribution would be the mean of the distribution (in this case, zero). However, the data in table 5 exhibit a large break in the distribution just below the mean. Since there is no comparable discontinuity in the central part of the distribution, we use this point rather than the mean to divide industries into a core sector (≥ -0.06) and a periphery sector (≤ -0.28).

As mentioned above, this *preliminary* sectoral assignment excludes professional services and public administration from the factor analysis because of the unavailability or questionable relevance of most of the industrial indicators for them. Rather than exclude these industries from our sectoral specification, we will assign them initially to the core sector on the grounds that the structure of the professions and public administration effectively insulates them from a highly competitive market structure.

Another result of limitations in the availability of data on industrial characteristics is the aggregation of 215 detailed census industrial categories into 55 broad industrial categories. One negative consequence of this aggregation is the creation of a few relatively heterogeneous categories. For example, the transportation category includes taxi companies as well as airlines, while wholesale trade includes drugs and chemicals as well as scrap and waste materials. In an effort to reduce this heterogeneity and also to provide a check on our "arbitrary" assignment of the professional and public administration industries, we turn to the only two indicators available for detailed industry categories: median income (U.S. Bureau of the Census 1973) and profit (Internal Revenue Service 1972b). These data on a more detailed industrial breakdown (112 industry categories and 21 professional and public administration categories) allow identification of more detailed core/periphery industry placements with uncharacteristically high or low levels of either profit or income and adjustment of sectoral placement. These adjustments provided new sectoral locations for 10 of 21 professional and public administration industries and for 11 of 122 other industries.[10] The final dichotomous sectoral distinction is presented in table 6.

[10] Detailed industry categories were reallocated from the core sector to the periphery if their average profit was less than $35,000 *or* if their workers' median annual income was less than $5,000. For the professional and public administration categories, only the median income criterion was used, since profit data are neither available nor

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Construction of a quantitative index of industrial differentiation requires an adjustment of the factor scores in table 5 to include professional and public administration categories. As noted above, only one of the nine indicators (median income) used in the factor solution is available for these two industries. To compute factor scores for professional and public administration categories, we use the standardized median income data and the overall mean values for all other variables (i.e., zero in standardized form in the factor solution). Applying factor weights to these values, we obtain index estimates of −0.07 for the professional category and 0.10 for public administration. In addition to the raw factor scores, table 6 presents rescaled scores that vary between 0 and 100.

THE IMPORT OF ECONOMIC SEGMENTATION

Thus far we have reviewed the historical foundation of theories of economic segmentation, identified a set of relevant empirical indicators, and defined two empirical measures of economic segmentation, one based on a dichotomous model of economic sectors and the other based on a conception of economic segmentation as a continuum ranging from highly oligopolistic to highly competitive. It remains to illustrate the substantive import of these measures for the analysis of socioeconomic processes. To do this we present analyses of a simple model of individual earnings determination for a sample of the experienced civilian labor force in the United States, drawn from the March 1976 Current Population Survey. This subset consists of all individuals age 16 or older who either were currently employed or had worked in the preceding five years and were seeking employment ($N = 62{,}568$).

Turning first to our dichotomous sectoral model, table 7 presents descriptive statistics by sectors for a set of relevant social and economic variables. The reader will note that there are significant differences between the two economic sectors for all of these variables. The two mea-

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relevant for such industries. Detailed industry categories were moved from the periphery sector to the core if profits exceeded $300,000 or the median income of workers was greater than $7,500. Industries moved to the periphery include (1) manufacturing: miscellaneous plastics; (2) transportation: buses, taxicabs, and miscellaneous transportation services; (3) utilities: water and other sanitary services; and (4) professional services: hospitals, convalescent institutions, elementary and secondary schools, colleges and universities, libraries, educational services, museums, religious organizations, welfare services, and nonprofit organizations. In the 55-category scheme, the miscellaneous manufacturing industries category includes ordnance. The detailed data indicate that ordnance has quite high profit and median worker income, while the remaining miscellaneous industries closely resemble periphery industries. Thus, ordnance was left in the core and the miscellaneous category was moved to the periphery. Industries moved to the core include (1) manufacturing: textile finishing and dyeing and leather footwear; and (2) wholesale trade: drugs and chemicals, electrical goods, metals and minerals, and alcoholic beverages.

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TABLE 5

RANKING OF INDUSTRIES BY FACTOR SCORE*

Industry	Factor Score
Nmfg: petroleum products..............................	2.40
Dmfg: motor vehicles...............................	2.21
Dmfg: primary metal................................	1.31
Nmfg: chemical and allied products................	1.30
Dmfg: transportation equipment....................	1.25
Mining: petroleum and natural gas.................	.99
Nmfg: paper and allied products...................	.92
Utilities and sanitary services......................	.87
Nmfg: tobacco......................................	.86
Dmfg: professional and photographic equipment......	.85
Dmfg: electrical machinery.........................	.83
Dmfg: machinery, except electrical.................	.81
Mining: nonmetallic quarrying......................	.68
Communications....................................	.68
Mining: metal ores................................	.64
Mining: coal.......................................	.60
Dmfg: stone, clay, glass products..................	.46
Transportation.....................................	.45
Dmfg: fabricated metal............................	.43
Nmfg: food, kindred products......................	.42
Finance: security, commodity brokerage.............	.38
Miscellaneous manufacturing.......................	.31
Nmfg: printing and publishing.....................	.29
Nmfg: rubber and miscellaneous plastics............	.27
Const: general, except building.....................	.26
Wh Tr: machinery, equipment, supplies.............	.16
Finance: banking..................................	.06
Const: general building............................	.05
Const: special trade contractors....................	.05
Finance: credit agencies other than banks............	.03
Finance: insurance.................................	−.01
Wh Tr: groceries and food.........................	−.06
Nmfg: textile mill products........................	−.28
Finance: real estate................................	−.30
Agricultural services...............................	−.39
Dmfg: furniture....................................	−.47
Dmfg: lumber and wood............................	−.48
Agricultural production............................	−.56
Wh Tr: miscellaneous wholesale trade...............	−.58
Bus Serv: advertising..............................	−.61
Nmfg: leather products............................	−.63
Rt Tr: building materials...........................	−.68
Rt Tr: furniture, home equipment..................	−.86
Rt Tr: auto sales, service stations.................	−.88
Nmfg: apparel products............................	−.92
Bus Serv: miscellaneous business services............	−.94
Bus Serv: auto repair..............................	−1.00
Entertainment and recreation services...............	−1.03
Rt Tr: miscellaneous retail trade...................	−1.04
Rt Tr: food stores.................................	−1.13
Rt Tr: general merchandise.........................	−1.43
Hotels and motels..................................	−1.45
Other personal services............................	−1.52
Rt Tr: apparel.....................................	−1.61
Rt Tr: eating and drinking places..................	−1.93

NOTE.—$\bar{X}$ = .43 × 10⁻⁷; SD = .93; SK = .17.

* Key to abbreviations: Nmfg = nondurable manufacturing; Dmfg = durable manufacturing; Const = construction; Wh Tr = wholesale trade; Bus Serv = business services; Rt Tr = retail trade.

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TABLE 6

INDUSTRIES, DETAILED CENSUS CODES, SECTORAL ASSIGNMENT, AND CONTINUOUS SEGMENTATION INDEX

Industry	1970 Census Code	Sector*	Factor Index	Scaled Index†
Agriculture, forestry, fisheries:				
Agricultural production..............	017	Periphery	−.56	32
Agricultural services................	018–28	Periphery	−.39	36
Mining:				
Metal mining......................	047	Core	.64	59
Coal mining.......................	048	Core	.60	58
Crude petroleum and natural gas......	049	Core	.99	67
Nonmetallic mining and quarrying.....	057	Core	.68	60
Construction:				
General building contractors..........	067	Core	.05	46
General contractors, except building...	068	Core	.26	51
Special trade contractors.............	069	Core	.05	46
Not specified construction............	077	Core	.05	46
Manufacturing—durable goods:				
Lumber and wood products...........	107–9	Periphery	−.48	33
Furniture and fixtures...............	118	Periphery	−.47	34
Stone, clay, and glass products........	119–38	Core	.46	55
Primary metal.....................	139–49	Core	1.31	75
Fabricated metal products............	157–69	Core	.43	55
Machinery, except electrical..........	177–98	Core	.81	63
Electrical machinery, equipment......	199–209	Core	.83	64
Motor vehicles and equipment........	219	Core	2.21	96
Other transportation equipment.......	227–38	Core	1.25	73
Professional, photographic, watches....	239–57	Core	.85	64
Ordnance.........................	258	Core	.31	52
Miscellaneous manufacturing..........	259, 398	Periphery	.31	52
Manufacturing—nondurable goods:				
Food and kindred products...........	268–98	Core	.42	55
Tobacco manufacturers..............	299	Core	.86	64
Textile—knitting mills...............	307	Periphery	−.28	38
Textile—dyeing and finishing.........	308	Core	−.28	38
Textile—floor covering...............	309	Periphery	−.28	38
Textile—yarn, thread, fabric mills.....	317	Core	−.28	38
Textile—miscellaneous products.......	318	Periphery	−.28	38
Apparel and other related products....	319–27	Periphery	−.92	23
Paper and allied products.............	328–37	Core	.92	66
Printing, publishing..................	338–39	Core	.29	51
Chemicals and allied products.........	347–69	Core	1.30	75
Petroleum and coal products..........	377–78	Core	2.40	100
Rubber products....................	379	Core	.27	51
Miscellaneous plastic products........	387	Periphery	.27	51
Tanned, curried, and finished leather...	388	Periphery	−.63	30
Footwear, except rubber..............	389	Core	−.63	30
Leather products, except footwear.....	397	Periphery	−.63	30
Transportation, communications, and other public utilities:				
Railroads and railway express.........	407	Core	.45	55
Street railways and bus lines..........	408	Periphery	.45	55
Taxicab service.....................	409	Periphery	.45	55
Trucking service....................	417	Core	.45	55
Warehousing and storage.............	418	Core	.45	55
Water transportation...............	419	Core	.45	55
Air transportation..................	427	Core	.45	55
Pipelines, except natural gas..........	428	Core	.45	55
Services incidental to transportation...	429	Periphery	.45	55
Communications....................	447–49	Core	.68	60
Electric, gas, and steam power........	467–69	Core	.87	65
Water, sanitary, and other utilities.....	477–79	Periphery	.87	65

* See text for procedures used to allocate industry to sectors.
† Rescaled to range from 0 to 100.

TABLE 6 (*Continued*)

Industry	1970 Census Code	Sector*	Factor Index	Scaled Index†
Wholesale trade:				
Motor vehicles and equipment........	507	Periphery	−.58	31
Drugs, chemicals, allied products......	508	Core	−.58	31
Dry goods and apparel...............	509	Periphery	−.58	31
Food and related products............	527	Core	−.06	43
Farm products—raw materials........	528	Periphery	−.58	31
Electrical goods.....................	529	Core	−.58	31
Hardware, plumbing, heating supplies..	537	Periphery	−.58	31
Not specified electrical, hardware......	538	Periphery	−.58	31
Machinery, equipment and supplies....	539	Core	.16	48
Metals and minerals, n.e.c............	557	Core	−.58	31
Petroleum products..................	558	Periphery	−.58	31
Scrap and waste materials............	559	Periphery	−.58	31
Alcoholic beverages..................	567	Core	−.58	31
Paper and its products...............	568	Periphery	−.58	31
Lumber and construction materials....	569	Periphery	−.58	31
Wholesalers, not specified, n.e.c........	587–88	Periphery	−.58	31
Retail trade:				
Lumber, building materials, hardware..	607–08	Periphery	−.68	29
Department, general merchandise stores	609–27	Periphery	−1.43	12
Food stores........................	628–38	Periphery	−1.13	18
Motor vehicles, gasoline, accessories...	639–49	Periphery	−.88	24
Apparel and shoe stores..............	657–58	Periphery	−1.61	07
Furniture, household appliances.......	667–68	Periphery	−.86	25
Eating and drinking places...........	669	Periphery	−1.93	00
Other retail trade..................	677–98	Periphery	−1.04	21
Finance, insurance, and real estate:				
Banking............................	707	Core	.06	46
Credit agencies.....................	708	Core	.03	45
Security brokerage and investment....	709	Core	.38	53
Insurance..........................	717	Core	−.01	44
Real estate........................	718	Periphery	−.30	38
Business and repair services:				
Advertising........................	727	Periphery	−.61	30
Automobile repair..................	757	Periphery	−1.00	21
Other business services..............	728–49, 758–59	Periphery	−.94	23
Personal services:				
Hotels and motels..................	777	Periphery	−1.45	11
Other personal services..............	769, 778–98	Periphery	−1.52	09
Entertainment and recreation services....	807–9	Periphery	−1.03	21
Professional and related services:				
Offices of physicians, dentists, practitioners, and health services.........	828–37, 847–48	Core	−.07	43
Hospitals, convalescent institutions....	838–39	Periphery	−.07	43
Legal services......................	849	Core	−.07	43
Educational services................	857–68	Periphery	−.07	43
Museums and other nonprofit firms....	869–87	Periphery	−.07	43
Engineering and architectural firms....	888	Core	−.07	43
Accounting and auditing services......	889	Core	−.07	43
Miscellaneous professional services.....	897	Core	−.07	43
Public administration.................	907–37	Core	.10	47

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sures of financial well-being, annual earnings and the natural log of annual earnings, both differ substantially between sectors. Core workers clearly earn more than their counterparts in the periphery. The sex composition of the two sectors also differs considerably. Females constitute only 29.32% of the core, while they dominate the periphery labor force (53.86%). Furthermore, a larger proportion of the periphery is nonwhite (11.2% vs. 9.01% in the core). Thus, workers in the core are more likely to be white, male, and financially advantaged than workers in the periphery. The other variables in table 7, years of schooling and occupational prestige, also vary by sector. Although the difference in schooling is less than one year, core workers do have significantly more schooling than periphery workers. A relatively large discrepancy exists between the two sectors in mean occupational prestige (40.35 for the core and 36.12 for the periphery).

The last column of table 7 presents the zero-order correlations between each of the variables and our continuous measure of economic segmentation. The highest correlations here are for the earnings variables, with decreasing correlations for sex, occupational prestige, schooling, and race, in that order. These results indicate that the continuous and dichotomous segmentation measures have roughly comparable relationships with the individual variables. The biserial correlation between the dichotomous and continuous measures is 0.87.

In introducing the two measures of industrial segmentation, we em-

TABLE 7

DESCRIPTIVE STATISTICS FROM 1976 CPS BY DICHOTOMOUS AND
CONTINUOUS SEGMENTATION INDICES

| | MEANS BY SECTOR | | | CORRE-LATION WITH CONTIN-UOUS INDEX |
CHARACTERISTIC	Core ($N = 27{,}918$)	Periphery ($N = 34{,}658$)	t-ratio	
Annual earnings............	10,637.957	6,198.071	−76.132*	.296*
	(8,077.570)	(6,627.535)		
ln annual earnings..........	8.828	7.877	−67.844*	.289*
	(1.434)	(1.956)		
Sex (1 = male)...............	.707	.461	−63.639*	.287*
	(.455)	(.498)		
Race (1 = white).............	.910	.888	−9.030*	.026*
	(.286)	(.315)		
Years of schooling...........	12.348	12.287	−2.564*	.075*
	(2.770)	(3.096)		
Occupational prestige........	40.353	36.116	−37.184*	.237*
	(13.101)	(14.970)		

NOTE.—Standard errors in parentheses.
* $P < .01$.

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phasized that the choice between them should rest on conceptual considerations. The dichotomous measure will be more appropriate for research on social and economic processes thought to be conditioned by the economic organization of industry. In such work researchers may be willing to sacrifice detail on the degree of competitiveness/oligopolism in exchange for the clarity of contrast between industry groups characterized by oligopoly as opposed to competition. The continuous measure, in contrast, treats a unit difference in economic differentiation as equivalent no matter where in the scale it appears. Users of this variable must be willing to give up the clarity of contrast between competitive and oligopolistic groups in return for the detail on levels of competition/oligopoly.

Because of the adjustments to detailed industrial categories used to construct the sectoral measure, that measure does not represent a simple dichotomization of the continuous measure. Still, it may be instructive to compare the application of the two measures to a simple model of earnings determination consisting of a set of individual characteristics from the CPS survey. The data for these comparisons are presented in table 8. Model 1 presents a baseline earnings model containing sex, race, occupational prestige, work experience,[11] and schooling. Models 2 and 3, respectively, add to this baseline earnings model the dichotomous and continuous measures of economic segmentation developed above. Finally, model 4 presents a covariance design that allows for the existence of differences in the earnings determination process between sectors, using the dichotomous sector variable.

Comparing model 1 with models 2 and 3, we see that the addition of either measure of economic segmentation represents a significant increment to the explanatory power of the baseline model containing only individual variables. While models 2 and 3 are roughly comparable in explanatory power, model 4 suggests that the assumption of homogeneity in earnings returns to individual characteristics may not be warranted. Each of the characteristics included in the baseline model has effects which vary according to sectoral location. All of these effects are greater in the core than in the periphery, with all slope differences being significant at the .001 level.

We interpret these results as confirming the utility of a dichotomous sectoral measure for analysis of the effects of economic segmentation on

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[11] Work experience for males is defined as experience $=$ (age $-$ schooling $-$ 5). For females this expression is adjusted to take account of lower labor force participation, using parameters estimated from the National Longitudinal Survey. These adjustments are discussed in detail in Beck, Horan, and Tolbert (1979).

    white ever-married females: experience $= 0.5483$ (age $-$ schooling $-$ 5)
    white never-married females: experience $= 0.8757$ (age $-$ schooling $-$ 5)
    nonwhite ever-married females: experience $= 0.6164$ (age $-$ schooling $-$ 5)
    nonwhite never-married females: experience $= 0.7731$ (age $-$ schooling $-$ 5)

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TABLE 8

A COMPARISON OF DICHOTOMOUS AND CONTINUOUS SEGMENTATION INDICES IN A SIMPLE EARNINGS MODEL

TERM	MODEL 1	MODEL 2	MODEL 3	MODEL 4	
				Core	Periphery
Intercept.................	−9,592.42*	−10,129.92*	−8,630.10*	−12,212.21*	−7,278.95*
Years of schooling.........	543.69*	576.23*	554.03*	771.01*	432.07*
Work experience...........	121.32*	121.24*	118.46*	140.88*	102.67*
Occupational prestige......	157.32*	142.39*	140.77*	161.43*	133.85*
Sex (1=male).............	4,673.37*	4,090.94*	4,274.48*	4,973.02*	3,518.88*
Race (1=white)...........	407.72*	361.84*	474.92*	725.40*	117.57
Sector (1=core)...........	...	2,418.85*	...	...	...
Continuous index..........	...	...	1,152.04*	...	...
$R^2 \times 100$................	36.05	38.32	37.45	39.26	

* $P < .001$.

socioeconomic processes. In cases where economic segmentation is assumed to have only additive effects on the variables under analysis, researchers may choose either dichotomous or continuous measures without substantial loss of explanatory power. In cases where researchers expect qualitative differences between economic sectors in relationships among variables, the dichotomous measure will facilitate a covariance design.

The apparent importance of dual economy theory for social stratification warrants further research activity aimed at developing a coherent research tradition. One prerequisite to such coherence is the development of empirical measures for basic concepts. In this paper we provide an empirical specification of economic segmentation which combines a range of theoretically relevant indicators with the best available data sources. We would be the last to claim that our findings should be interpreted as final, or written in stone.[12] Other analyses using different variables or data might well obtain different solutions or cutting points. Nonetheless, over the course of the present analysis we have been impressed with the stability of the basic solution over variations in choice of variables. The final demonstration of the efficacy of the measures of economic segmentation presented here must necessarily rest on future applications in research on social stratification and mobility.

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[12] While this manuscript was in press, Oster's (1979) work was brought to our attention. Oster undertakes a factor analysis on a set of 25 industry variables to test for the existence of a "dual economy factor" which loads significantly on relevant variables. He reports a solution in which loadings correspond to ". . . expectations about the existence of a core-periphery pattern of industrial stratification" (p. 36).

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